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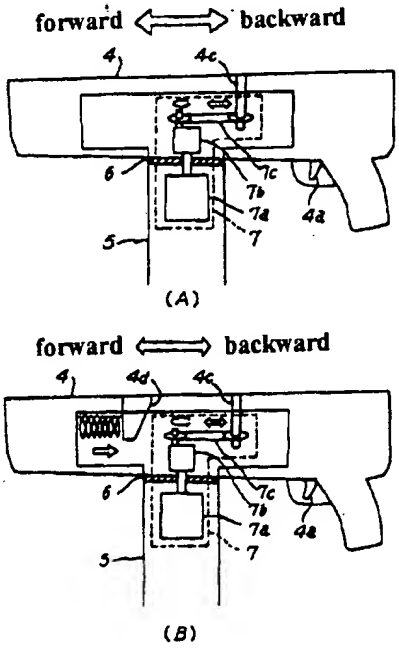
(54) [Title of the Invention] Gun Unit for Game Machine Equipped with Sliding Vibration Mechanism

(57) [Abstract]

[Object] To obtain a gun unit used for an electronic game machine or other such game machine, which makes a player feel as if he is actually firing a machine gun.

[Constitution] A support shaft 5 of a gun unit is equipped with a slider 6 for carrying a gun body 4 of the gun unit and sliding it back and forth, and a reciprocating vibrating mechanism 7 for vibrating the gun body 4 carried by the slider 6 back and forth according to an operating command from the game machine. The reciprocating vibrating mechanism 7 comprises, as shown in the drawings for example, a motor 7a, an eccentric cam 7b inserted into a rotor of the motor 7a, and a link 7c for coupling a coupler 4c provided inside the gun body 4 and a coupler of the eccentric cam 7b, and generates reciprocating motion.



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[Claims]

[Claim 1] A gun unit for an electronic game machine or other such game machine equipped with sliding vibration mechanism, wherein said game machine gun unit is characterized in that a support shaft of the gun unit is equipped with a slider for carrying a gun body of the gun unit and sliding it back and forth, and a reciprocating vibrating mechanism for vibrating the gun body carried by the slider back and forth according to an operating command from the main body of the game machine.

[Claim 2] The gun unit for a game machine equipped with sliding vibration mechanism according to Claim 1, wherein the gun body is coupled with the support shaft, and there is provided an elastic member disposed such that tensile force or restoring force acts in the rearward direction of the gun body.

[Detailed Description of the Invention]

[0001]

[Field of Industrial Utilization]

The present invention relates to a gun unit used in an electronic game machine or other such game machine, and more particularly relates to a game machine gun unit equipped with a vibrating mechanism for simulating the recoil when a bullet is fired.

[0002]

[Prior Art]

Electronic game machines installed in amusement centers and so forth include so-called gun games, in which the player uses a simulated gun (such as a pistol) to fire at a target displayed on the screen of a display device. In general, with a gun game, the firing direction and position are detected by a position detector at the point when the player pulls the trigger of the gun, a firing sound or other such sound effect is outputted by the electronic game machine, and whether the bullet hit its target or not is determined on the basis of the detection information in the position detector. If the shot was a hit, a hit scene is displayed on the screen and a hit sound is outputted. Since the gun used with such games does not actually fire any bullets, the game is given a more realistic feel by vibrating the gun unit with a vibrating mechanism inside the gun unit at the point when the gun trigger is pulled, so as to simulate the recoil produced when a gun is fired.

[0003] Figs. 2 A and B are cross sections of first and second structure examples for a game machine gun unit equipped with a conventional vibrating mechanism. The gun unit consists of an integrally molded gun 1 and support shaft 2, and a vibrating mechanism 3 is provided inside the gun 1. The rotatable support shaft 2 can be tilted in the directions of the arrows L1 and L2 around a pivot point C of a turning mechanism (not shown) located underneath, which allows the player to aim the gun at the target.

[0004] Fig. 2A is an example in which a solenoid magnet is used as the vibrating mechanism 3. The solenoid magnet 3S consists of an electromagnet composed of a cylindrical coil that generates a magnetic field, and an armature (rotor) that moves reciprocally along the center axis of this coil. When the player pulls the trigger 1a of the gun 1, the solenoid magnet 3S is actuated, and the reciprocal motion of the armature

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causes the distal end thereof to hit a protrusion 1S. This striking of the protrusion 1S tilts the gun unit in the direction of arrow L2 around the pivot point C, and the continuous tilting caused by repeated firing results in vibration. This vibration is transmitted to the player's hand from a grip 1b linked directly to the support shaft 2, which allows the player to physically feel the firing recoil.

[0005] Fig. 2B is an example of a gun unit in which the vibrating mechanism 3 provided inside the gun 1 is made up of a motor 3M and an eccentric weight 3W. In this example, when the player pulls the trigger 1a of the gun 1, the motor 3M inside the vibrating mechanism 3 is actuated, and the rotational movement of the eccentric weight 3W attached to the rotating shaft of the motor 3M causes the gun unit to vibrate in a circle with respect to the rotational axis. This vibration is transmitted from the grip 1b to the player's hand, and this gives the player the sensation of firing a gun, produced by gentle vibrations.

[0006]

[Problems Which the Invention is Intended to Solve]

However, with the conventional gun unit described above, the gun and the support shaft were integrated, with the support shaft itself serving as the grip. Since the grip was vibrated indirectly by vibrations from a source provided inside the gun, only gentle vibrations were transmitted to the player. Also, since the vibration direction was different from that of a real gun, the sensation was far removed from that produced by the recoil of an actual hand gun or machine gun.

[0007] The present invention was conceived in light of the above situation, and it is an object thereof to eliminate the above-mentioned drawbacks and provide a gun unit for a game machine, equipped with a sliding vibrating mechanism that feels as if an actual gun is being fired.

[0008]

[Means Used to Solve the Above-Mentioned Problems]

The present invention relates to a gun unit equipped with a sliding vibrating mechanism and used in electronic game machines and other such game machines. The stated object of the present invention is achieved by equipping a support shaft of a gun unit with a slider for carrying a gun body of the gun unit and sliding it back and forth, and a reciprocating vibrating mechanism for vibrating the gun body carried by the slider back and forth according to an operating command from the main body of the game machine.

[0009]

[Operation of the Invention]

With the present invention, a support shaft is equipped with a sliding vibrating mechanism, and the gun body is vibrated by being slid back and forth according to a drive command from the main body of the game machine, so the vibrations produced by the reciprocal movement of the gun are transmitted directly to the hand holding the gun. Furthermore, the gun body and the support shaft are coupled, and an elastic member is disposed such that tensile force or restoring force acts in the rearward direction of the gun body. As a result, the movement speed is faster in the direction opposite the direction in

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which the bullet is fired, so the movement of a recoiling gun body can be accurately reproduced.

[0010]

[Examples]

An example of the present invention will now be described in detail through reference to the drawings. Fig. 1A is a cross section of a first structure example of a game machine gun unit equipped with the sliding vibrating mechanism of the present invention. As shown in Fig. 1A, the gun body 4 and the support shaft 5 are separate parts in this gun unit. The support shaft 5 of the gun unit is provided with a slider 6 for sliding the gun body 4 back and forth, and a reciprocating vibrating mechanism 7 for vibrating the gun body 4 carried by the slider 6 back and forth according to an operating command from the main body of the game machine (not shown).

[0011] The reciprocating vibrating mechanism 7 comprises, as shown in Fig. 1A for example, a motor 7a, an eccentric cam 7b inserted into a rotor of the motor 7a, and a link 7c for coupling a coupler 4c provided inside the gun body 4 and a coupler of the eccentric cam 7b. The slider 6 comprises, for example, a slider unit that carries the gun body 4, and a track rail, and is designed so that the gun body 4 can slide back and forth along the track rail. The vibrating mechanism 7 here is not limited to the structure shown in Fig. 1A, and may employ a solenoid magnet instead.

[0012] The following is an example of how the gun unit of the present invention operates with a structure such as this. When the player pulls the trigger 4a of the gun body 4, the motor 7a is driven according to a command from the main body of the game machine (not shown), the rotation motion of an eccentric cam 5c becomes reciprocal motion and is transmitted through the link 7c to the coupler 4c inside the gun body 4, and the gun body 4 reciprocally moves a specific distance back and forth along the track rail inside the slider 6. The stroke is controlled by the drive command from the main body of the game machine, and the speed of the reciprocal motion can be varied according to the type of gun and how the game develops.

[0013] Fig. 1B is a cross section in which a speed changing means for changing the movement speed in the forward and rearward directions of the gun body 4 is added to the vibrating mechanism 7 shown in Fig. 1A. This allows the movement of the gun body to be modulated. An elastic member receiver 4d is provided inside the gun body 4, and the gun body 4 and the support shaft 5 are coupled via an elastic member 5e at the forward position of the vibration source. With this structure, when the gun body 4 slides forward along the track rail inside the slider 6, the elastic member 5e is compressed, and the restoring force thereof is exerted to the rear. As a result, the gun body 4 moves quickly in the rearward direction and slowly in the forward direction. Generating action such as this allows the movement of a gun body as it recoils when fired to be reproduced more accurately.

[0014] Further, in the above example, an electric actuator was used as the sliding vibrating mechanism for vibrating the gun body back and forth, but a "pneumatic actuator" or "hydraulic actuator," which controls the output of an energy accumulator (such as an air compressor or a hydraulic power unit) with valves and pneumatically or

hydraulically drives a cylinder, may be used instead. From the standpoints of response, momentum, durability, cost, and so forth, however, the sliding vibrating mechanism shown in Fig. 1 is superior in overall performance. Also, the elastic member 5e in Fig. 1B was a cylindrical coil spring, but is not limited to this, and may instead be a spiral spring, flat spring, or the like. Also, the disposition of the elastic member 5e is not limited to acting compressively, and may instead act in tensile fashion.

[0015]

[Effect of the Invention]

As discussed above, with the game machine gun unit equipped with a sliding vibrating mechanism of the present invention, a sliding vibrating mechanism is provided to a support shaft, and the gun is slid back and forth according to drive commands from the main body of the game machine, so vibration produced by the reciprocal motion of the gun is transmitted directly to the hand holding the gun, allowing the player to experience a powerful sensation of firing a gun. Furthermore, a speed changing means is provided so that the movement speed is faster in the direction opposite the direction in which a bullet is fired, so it feels as if a real machine gun is being fired.

[Brief Description of the Drawings]

Fig. 1 consists of cross sections of first and second structure examples for a game machine gun unit equipped with the sliding vibrating mechanism of the present invention.

Fig. 2 consists of cross sections of first and second structure examples for a game machine gun unit equipped with a conventional vibrating mechanism.

[Key]

4 gun body

5 support shaft

6 slider

7 vibrating mechanism

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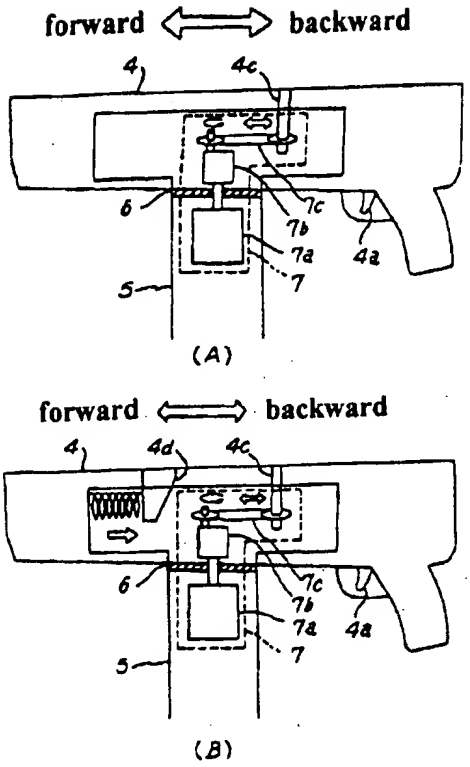
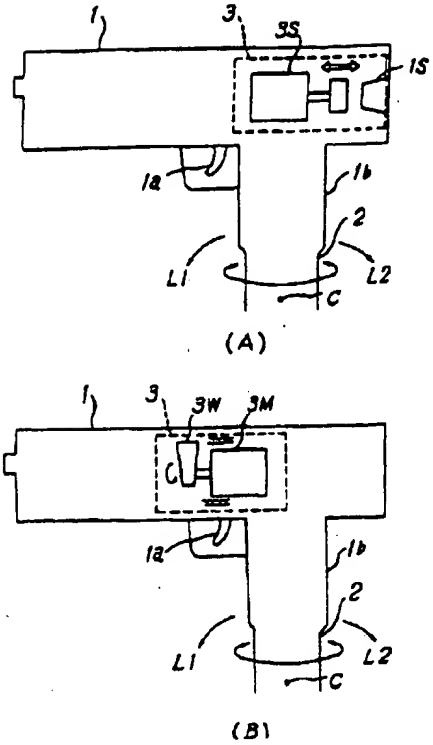
[Figure 1]



[Figure 2]



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